MSNE 407-408 2014-2015 Syllabus 29Nov2014

CAPSTONE DESIGN PROJECT II - An interdisciplinary capstone design experience in materials science and nanoengineering. This course provides an opportunity for students to apply knowledge and skills acquired in previous courses to the solution of a realistic engineering problem. Teams of students will specify, design, and build an engineering system/device/process to meet a prescribed set of requirements. Must complete MSNE 407 to receive credit for MSNE 408 and both courses must be taken the same academic year. Required for MSNE majors in B.S. program.

Instructor: Peter Loos Office: MEB 215 ploos@rice.edu **Office hours:** after class or by appointment
Course meets: 9:00-9:50 am MWF in MEB 128

This class is not like most others you have taken. There are no tests, no quizzes, no final exam, no textbook, no terminology to memorize, and no equations to derive. Many different topics, tools and ideas will be presented and it is up to you to combine those with your knowledge of materials science to design a useful material, process, or device. You are expected to act at your own initiative, work hard, find your own resources, engage in effective teamwork, be creative, be analytical, and be an independent engineer to succeed in this class.

One or more design and analysis projects will be scheduled for the duration of both semesters. These projects are the primary focus of the course. The project topics will be described in detail at the beginning of the fall semester. Students will be divided into teams and among the projects, as much as possible according to their preferences.

A second focus of the course are ABET requirements per www.abet.org/eac-criteria-2014-2015/ .

A student's responsibilities in this course may be divided into three areas: 1) Lectures and workshops on important topics in design and analysis, 2) the design and analysis work, and 3) documentation of that work. Lectures and workshops will occupy about three hours a week. Each student should expect to devote an average of at least 6 hours per week for the fall semester in addition to attending lectures and/or workshops.

Detailed descriptions of the required deliverables will be provided at a later date. Briefly, they will include:

- A weekly meeting of the team with its faculty advisor
- An individual Log Book
- A team Project Binder containing all documentation (reports, presentations, and supporting materials)
- An end-of-semester oral presentation and written report
- A functional prototype that has been tested against design criteria

Grading Policies: Semester grades will be based on both team and student's overall performance, including the items listed below. The exact value of each item below is left to the discretion of the advisor and will be discussed with each team the first week of class.

Team effort:
- Project Binder (including all documentation)
- End of semester oral presentation & written report
- Weekly Progress Reports
- Design execution

Individual effort:
- Log Book
- Participation in meetings and design activities
- Contribution to the team's success
- Assignments related to the ABET Student Outcomes

Any disputes over grading should be brought to the instructor or project mentor in a timely manner.

Absence Policy: Attendance at all lectures is required. Attendance will be taken and results provided to project advisors to be factored into the participation grade.

Honor Code Policy: Students are encouraged to talk to each other, to the instructors, or to anyone else about any assignment in the course that is not specifically designated as "pledged".

Goals for this course:

To address ABET Student Outcomes and Program Criteria, students will have

(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints...
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

and the course will help prepare graduates

- to apply advanced science ... and engineering principles to materials systems ...
- to integrate the understanding of the scientific and engineering principles underlying the four major elements of the field: structure, properties, processing, and performance ...
- to apply and integrate knowledge from each of the above four elements of the field to solve materials selection and design problems, and;
- to utilize experimental, statistical, and computational methods ...

and in addition

- students will acquire specific knowledge regarding one class of materials which is the focus of the project.

Resources:

OEDK Equipment: http://oedk.rice.edu/oedk-resources Tech Support: http://oedk.rice.edu/techsupport
Gary Cisneros cisneros@rice.edu MSNE Technician
Compendex/Inspec All fields of Engineering, physics, electronics, etc. Watch this MIT video (3:32).
SciFinder The most comprehensive chemical information database, including articles, patents, conference papers, and theses. View Tutorials. Contact administrator for access.
Web of Science/ Web of Knowledge High impact journal articles in all fields.
Scopus Competitor to Web of Science. Includes all subjects and cited reference searching.
OneMine Full text papers from the Minerals, Metals & Materials Society (TMS), the American Institute of Mining, Metallurgical and Petroleum Engineers (AIME) and more.
MRS Online Proceedings Library Papers from the Materials Research Society (MRS) Symposium. 1980-present.
ASM Materials Information Includes the **ASM Handbooks**, **Alloy Finder**, and other ASM products.
American Society for Testing and Materials: Annual Book of ASTM Standards In print, apparently not online.
ASM Handbook In print, or available online at SlideShare.com .
Binary alloy phase diagrams **ASM Handbook Volume 3** In print, or at SlideShare.com .
CRC Handbook of Chemistry & Physics Searchable data on thousands of materials' structure and properties

Any student with a disability requiring accommodations in this class is encouraged to contact the instructor after class or during office hours. Additionally, students should contact the coordinator for Disabled Student Services in Allen Center.